Automatic switching apparatus for an electrical appliance.

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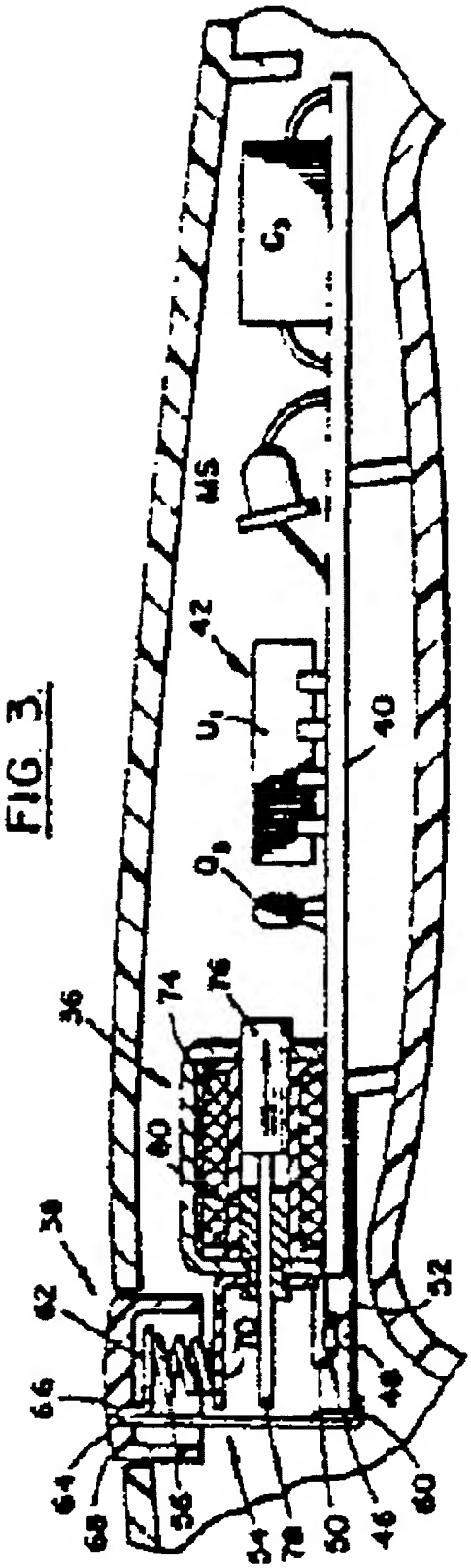
Abstract of **EP0231987**

Automatic switching apparatus is incorporated in a hand-held electrically operated appliance such as a pressing iron (20). A motion sensor (MS) and an electronic timer (U1) cooperate to automatically shut off the iron if the iron remains stationery for a predetermined period of time. A latch mechanism (54) is manually operable in the event the user desires to reactivate the iron. Electronic circuitry is mounted on a circuit board (40) located within the handle (28) of the iron. An appropriate indicator (N) informs the user whether the iron is in an active mode or an inactive mode.



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(54) Automatic switching apparatus for an electrical appliance.

(57) Automatic switching apparatus is incorporated in a hand-held electrically operated appliance such as a pressing iron (20). A motion sensor (MS) and an electronic timer (U_1) cooperate to automatically shut off the iron if the iron remains stationery for a predetermined period of time. A latch mechanism (54) is manually operable in the event the user desires to reactivate the iron. Electronic circuitry is mounted on a circuit board (40) located within the handle (28) of the iron. An appropriate indicator (N) informs the user whether the iron is in an active mode or an inactive mode.

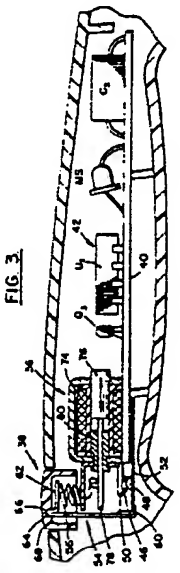

FIG. 3

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AUTOMATIC SWITCHING APPARATUS FOR AN ELECTRICAL APPLIANCE

BACKGROUND OF THE INVENTION

I. FIELD OF THE INVENTION

The present invention relates generally to automatic switching apparatus and, more particularly, to automatic switching apparatus for use with appliances having electronic controls.

II. DESCRIPTION OF THE PRIOR ART

The possibility of leaving an electrically operated appliance, such as a pressing iron, turned on and unattended for an extended period of time is a concern to many users. Some top-of-the-line pressing irons now provide the feature of automatic shut-off if the iron is not used for a predetermined period of time. Typically, the feature is included in a complete electronic control system using a microprocessor and an electromagnetic relay or a solid state switch such as a triac to control power to the heating element. Both of these devices are expensive and have other drawbacks as well. A triac, for example, requires a sizeable heat sink to dissipate its power loss when the iron is on and an iron is obviously a poor location for such a device because of the hot environment it represents. A power relay requires a significant amount of power to operate and tends to heat up when it is kept energized in the hot iron environment.

SUMMARY OF THE INVENTION

It is an object of the present invention to provide an improved automatic switching apparatus, and an improved electric iron incorporating such.

According to one aspect of the present invention, there is provided an automatic switching apparatus for a hand-held electrically operated appliance, characterized by switch means convertible between a power mode for electrically connecting the appliance to source of electrical power and a dormant mode for electrically disconnecting the appliance from the source of electrical power; electromechanical means operable when energized for converting said switch means to the dormant mode; a motion sensor responsive to movement of the appliance for generating a signal; and timer means for timing a preset period of time responsive to said motion sensor signal, and for energizing said electromechanical means upon lapse of said preset period of time unless a subsequent motion sensor signal is generated.

Manually operable reset means may be provided for converting the switch means to the power mode. The reset means may comprise latch means for latching the switch means in the power mode.

The switch means may comprise first and second mutually engageable contacts. A resilient blade may bias the second contact away from engagement with the first contact. The latch means preferably releasably engages with the blade for holding the first and second contacts mutually engaged, the reset means, when actuated, effecting engagement of the latch means with said blade.

Electronic circuitry means which includes the timer means, may be provided for limiting the energizing of the electromechanical means to a period of up to about one second in time upon energization of the electromechanical means by the timer means.

The above automatic switching apparatus is preferably included in an electric pressing iron.

The electric iron may have a sole plate and a heating element for heating the sole plate, the above switch means connecting the heating element to the source of electrical power in the power mode and disconnecting the heating element from the source of electrical power in the dormant mode.

A housing of the iron above the sole plate may contain the switch means, the electromechanical means, the motion sensor and the timer means. A manually depressible button may be resiliently urged outwardly with respect to the housing, actuation of this button resetting the switch means from the dormant mode to the power mode.

The housing of the iron preferably has a handle portion containing a printed circuit board, the circuit board having mounted thereon and switch means, the electromechanical means, the motion sensor and the timer means.

A lamp may be disposed under the reset button and be electrically connected to the switch means for indicating when the electric iron is in the power mode.

Another object of the present invention is to provide an improved method of operating a hand-held appliance, such as an electric iron.

Accordingly, there is provided by another aspect of the present invention a method of operating a hand-held electrically operated appliance having an automatic switching apparatus characterized by the steps of connecting the appliance to a source

of electrical power for operation of the appliance; sensing the lack of motion of the appliance; timing electronically the length of time that the appliance remains motionless; and disconnecting the appliance from the source of electrical power when the length of time that the appliance remains motionless exceeds a preset value.

It will be appreciated that the present invention, as disclosed in relation to the preferred embodiments, represents a simpler and lower cost system according to which power may be controlled by a manually closed set of contacts which may be tripped open by a small solenoid. The solenoid is preferably energized by an electronic timing circuit whenever the iron is "on" but not moved for a predetermined time interval, typically, seven to ten minutes. A small mercury switch may be mounted so that it opens and closes randomly when moved by the normal ironing motions. Each time the switch opens, the timer is reset to the start of its main cycle so that with normal iron use, the power will never be turned off.

As the cost of electronic circuitry continues to decrease, it has become possible to provide features for home appliances which were not heretofore economically feasible. Such features include those directed to operating convenience and increased utility as well as features which provide for safer operation of the appliance. The preferred embodiments incorporate some such features together with a simplified mechanism enabling the user to reactivate the appliance once it has been turned off for lack of use.

One feature of the preferred embodiments of the present invention is that no energy need be expended in a separate system to keep the iron energized. That is, unlike some known constructions, which require the continuous application of electricity for operating relays and the like to open and close contacts, and resulting in the further generation of non-usable heat, the preferred embodiments of the invention rely on operator energy to actuate a button to return the iron to the power mode. Furthermore, only a momentary flow of electricity is required to convert the iron to the dormant mode in the event the iron remains inactive for the seven to ten minute time interval mentioned above.

Other objects, features and advantages of the present invention will become more fully apparent from the following detailed description of the preferred embodiments, the appended claims and the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a top plan view, certain parts being cut away, illustrating an electrical appliance in the form of a pressing iron embodying the invention;

Figure 2 is a side elevation view, certain parts being cut away and in section, of the pressing iron illustrated in Figure 1;

Figure 3 is a detail elevation cross section view illustrating a portion of the appliance depicted in Figures 1 & 2;

Figures 4 & 5 are further detail views in cross section, similar to Figure 3, and illustrating successive positions of a reset mechanism utilized by the invention;

Figure 6 is a top plan view of a circuit board utilized by the invention and illustrating the relative positioning of the electronic components thereon;

Figure 7 is a schematic drawing of a typical electronic circuit utilized by the invention;

Figure 8 is a detail elevation cross section view similar to Figure 3 and depicting another embodiment of the invention;

Figure 9 is a detail bottom plan view of the embodiment depicted in Figure 8;

Figure 10 is a detail front elevation view of parts illustrated in Figure 8; and

Figure 11 is a detail side elevation view of the construction illustrated in Figure 10.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Turn now to the drawings and initially to Figures 1 & 2 which illustrate an electric pressing iron 20 which includes a sole plate 22, typically of cast aluminum, on which is mounted a housing 24, typically of molded plastic. The housing 24 includes a bottom portion or skirt 26 and a handle portion 28 connected by a rear pedestal 30 and a throat 32. Extending from the rear of the handle portion 28 and the top of the pedestal 30 is a line cord 34 for connecting the iron to a source of power. A number of user controls including a temperature selector knob, steam actuator, and steam control button may be provided on the housing 24 but constitute no part of the present invention and thus will not be discussed.

Turn now to Figure 3 which illustrates at the left side, that is, the front of the handle portion 28, a pair of mechanisms, namely a solenoid mechanism 36 and a reset mechanism 38. These mechanisms are mounted on the front end of the printed circuit board 40 upon which is also mounted an electronic timing circuit 42 including an electronic timer U, and a motion detector switch MS. The

specifics of the electronic timing circuit will be described below. A pair of contacts 46 & 48 are connected in series with one power line extending between the line cord 34 (Figure 2) and all of the electrical or electronic circuits in the iron 20. The contact 46 is mounted to a fixed blade 50 which is riveted or otherwise secured to the circuit board 40. The contact 48 mounted on a flexible blade 52 which is biased such that, unless otherwise restrained, the contacts will be moved to an open position as illustrated in Fig. 4.

A latch 54 serves to hold the contacts closed, the upward force exerted by a compression spring 56 accomplishing this result. Specifically, the latch 54 comprises a downwardly extending leg 58 - (Figure 5) terminating at a foot 60 which is engageable with the undersurface of the flexible blade 52. The latch 54 also includes a generally horizontally extending head member 62 which intersects with the leg 58 at an upwardly projecting pivot bearing 64 (Figure 3). The pivot bearing 64 is received in a groove 66 formed in an underside of the reset button 68. The compression spring 56 extends between a spring support platform 70, cantilevered from the support structure for the solenoid mechanism 36, and the head member 62.

The solenoid mechanism 36 comprises a housing or frame 72 suitably mounted on the printed circuit board 40. The housing 72 encompasses a coil 74 which, when energized, drives an armature 76 to the left as seen in Figure 3. A free floating rod 78 is mounted for reciprocation in a bushing 80 supported on the housing 72 and is coaxial with the armature 76. When the coil 74 is energized, the armature 76 moves to the left, pushing the leg 58 of the latch 54 also to the left (Figure 4). In this manner, the foot 60 moves out from under the flexible blade 52, thus allowing the contacts 46 and 48 to open. The contacts are then held open by the flexible blade 52. When the solenoid is de-energized, the foot 60 is held against the nose 82 by the bias of the compression spring 56 acting on the latch 54.

To reenergize the iron, the reset button 68 is depressed as indicated by an arrow 83 in Figure 5,to a position somewhat below the position illustrated in Figures 3 & 4. The latch 54, and specifically the foot 60, slides down the front portion of the nose 82 and is drawn under the extreme end of the flexible blade 52 by the spring 56 acting on the head member 62.

At this stage of operation, the coil 74 is not energized which leaves the armature 76 and rod 78 free to move axially in a direction away from the latch 54. As illustrated in Figure 5, the leg 58, in returning to its latched position, pushes the rod 78 and therefore the armature 76 towards the right. When the user releases the button 68, the spring 56 raises the button, and with it the latch 54, until the contacts 46 and 48 again close to the position illustrated in Figure 3, thereby again energizing the iron.

It is noteworthy that in this embodiment the contacts 46 and 48 cannot be held closed by holding the button 68 down. This is for the reason that depressing the button allows the contacts to open. Even if the button is jammed in its normal position, the switch will still trip open when the coil is energized.

Turn now to Figures 3, 6 and 7. The electronic control circuitry is physically illustrated in Figure 6 and is schematically illustrated in Figure 7. Power is controlled by the manually closed set of contacts 46 and 48 which, as just described, can be tripped open by the small solenoid mechanism 36. The coil 74 of the solenoid mechanism is energized by the electronic timing circuit 42 (Figure 7) whenever the iron is "on" but not moved for a predetermined time interval. This time interval is typically seven to ten minutes, but can be of any desired duration. A small motion detector switch MS, which may be a mercury switch, is mounted on the circuit board 40 such that it opens and closes randomly when moved by normal ironing motions. Each time the switch opens, the electronic timer U_{11} is reset to the start of its timing cycle so that with normal iron use the power will never be turned off.

Referring now particularly to Figure 7, a power lead W_1 is connected to the reset switch represented by the contacts 46 and 48 (see Figure 3-5), a single pole switch which is closed to a latch closed condition, as previously described, by manually depressing the reset button 68. This reset switch then remains closed until tripped open by the solenoid coil 74 being energized, also as previously described. From the reset switch represented by the contacts 46 and 48, power proceeds through a power lead W_2 to an over temperature limiter 84, a thermostat 86, and a calrod heating element 88 which are all the same as in conventional irons. The other calrod terminal is connected to a power lead W_3 and is also the "common" circuit for the electronic circuitry. A capacitor C_5 and a metal oxide varistor M, one example being a General Electric V130LA2 MOV, are added across the power leads W_2 and W_3 for transient suppression.

Whenever the contacts 46 and 48 are closed, the user is informed that the iron is "on" by the illumination of a neon bulb N, current flow through which is limited by a resistor R_{12} in series therewith. With the contacts 46 and 48 closed, power is also supplied to the electronic circuitry. The resistors R_1 and R_{11}, diode CR_1 and capacitor C_1 form a d.c. power supply providing approximately +11 volts across the capacitor C_1. This voltage is re-

duced and regulated at 9.1 volts by the resistor R_{10} and the zener diode CR_3. An integrated circuit timer U_1 is used to time the seven to ten minute turn off delay. An acceptable form of the circuit timer U_1 is a TLC555C integrated circuit timer manufactured and sold by Texas Instruments, or equivalent. The capacitor C_3 is continually being charged through the resistor R_4, and since no base current is supplied to the transistor Q_1, the transistor Q_1 is "off" and does not discharge the capacitor C_3. The seven to ten minute interval is determined by the time required to charge the capacitor C_3 to two-thirds the voltage at pins 4 and 8 of the timer U_1.

The motion detector switch MS, a small mercury switch, as noted above, is normally closed and capacitor C_2 is charged to approximately 4.5 volts. An acceptable version of the motion detector switch suitable for purposes of the invention is model TS66 sold by Fifth Dimension, Inc. of Clinton, New Jersey. When the iron 20 is moved, as in normal ironing motion, the motion switch MS opens momentarily and capacitor C_2 starts to charge towards approximately 9 volts through the resistor R_2. This charge current is also base to emitter current in transistor Q_1 so that the transistor Q_1 is turned on, momentarily, thereby discharging capacitor C_3 and thus resetting the timer U_1. When the motion switch MS recloses, capacitor C_2 is partially discharged again through the resistor R_3, the motion switch MS, and resistor R_9, and the transistor Q_1 is again turned "off".

The timer U_1 is connected as a astable oscillator having its output at pin 3 "high" (approximately 9 volts) for seven to ten minutes followed by several milliseconds "low" (approximately 0.1 volts) depending upon C_3/R_5 discharge timing. Resistor R_5 determines the rate at which capacitor C_3 is discharged when the circuit times out because the iron has not been used for 7 to 10 minutes. This insures that the SCR will be turned on long enough to always trip the solenoid actuated switch. The transistor Q_2 inverts this voltage from pin 3 of the time U_1 so that its collector is at a low voltage when pin 3 is high and high when pin 3 goes low at the end of the timing period. In this context, resistor R_6 is the biasing resistor for transistor Q_2 when pin 3 is high thereby limiting the base current of transistor Q_2 to a safe value. When the collector of the transistor Q_2 goes "high", the diode CR_2 conducts enough current through resistor R_7 to resistor R_8 and to the gate of an SCR Q_3 to cause the SCR gate to turn "on" during positive half cycles of voltage on the power lead W_1. Resistor R_7 biases the gate of SCR Q_3 and limits the collector current to transistor Q_2 to a value that enables the charge on capacitor C_1 to last long enough to insure that the solenoid 36 will trip the switch. Heavy current pulses then flow through the solenoid coil 74 causing it to trip the reset switch contacts 46 and 48 to an open position which removes power from the iron heating circuit and from the control circuit.

Capacitors C_4 and C_5 increase the noise immunity of the timer U_1 as is well known. Also, a resistor R_8 stabilizes the gate of SCR Q_3 so that voltage withstand and dv/dt characteristics are improved.

Thus it will be appreciated that the mechanism described is a simple, low cost, low power, manually closed but electrically tripped open switching device which is ideally suited for electrical appliances such as a pressing iron. The energy to close and open the electrical contacts and the contact holding force and weld breaking force are all supplied by the user in pushing the reset button 68. Only a momentary current is used to trigger the device and allow a previously stressed spring, namely the flexible blade 52, to open the power switching contacts 46 & 48.

Another, and preferred, embodiment of the mechanism of the invention will now be described with reference to Figures 6-11. The circuit board 40 supporting all of the electronic components previously described is suitably mounted in the handle portion 28 of the iron 20. As seen in Figure 8, a solenoid mechanism 102 is mounted on the circuit board 40 and includes a plastic chassis or coil bobbin 104, a coil 106, and an armature 108 which moves to the left (Figure 8) when the coil 106 is energized.

Just inboard from an end 110 of the circuit board 40 is an opening 112 (Figure 9) through which a stationery contact 114 extends, mounted on a suitable support 116 which is suitably fixed to the circuit board. A flexible blade 118 is bifurcated at a forward end and has a pair of tabs 119 at a rearward end received through openings 119A and in the circuit board (Figure 9). The tabs 119 are bent over and engage the circuit board to affix the blade thereto. The blade 118 extends forwardly and has mounted thereon a movable contact 120 which is engageable with the stationery contact 114. However, the flexible blade 118 is formed of a suitable spring material biased so that the contacts 114 and 120 are normally separated unless forced together by an outside influence.

Such an outside influence is in the form of a latch 122. The latch 122 includes an elongated latch release spring 124 mounted at its rear end to the bobbin 104 of the solenoid mechanism 102 and biased upwardly. Near its forwardmost end, the latch release spring 124 has a pair of depending wings 126 which are suitably pierced to receive a transversely extending bearing pin 128 for pivotally mounting thereon a downwardly extending latch lever 130. At a lower extremity of the latch lever

130 is a foot 132 which is releasably engageable with an edge 134 in a recessed region 136 at the end 110 of the circuit board 40. A latch spring 133 is also mounted on the pin 128, with one end bearing against the latch release spring 124 and the other end against the latch lever 130 to urge the latter in a counterclockwise direction (Figures 8 and 11). Spaced above the foot 132 and integral with the latch lever is a lobe 138 which is engageable with an upper surface of the flexible blade 118. A non-magnetic extension 140, preferably of molded plastic material, at the forward end of the armature 108 is engageable with a rear surface of the latch lever 130 and is selectively operable to move the foot 132 out of engagement with the edge 134.

A reset button 142 extends through an opening 144 in the handle portion 28. A peripheral flange 146 on the button 142 is engageable with the opening 144 and restrains the button against further upward travel. Since the reset button 142 is mounted on the upper surface of a button retainer spring 148, it is, in effect, captured in place on the handle portion 28. The retainer spring 148 is suitably fastened to the handle portion 28 far to the rear of the reset button 142,and at its forward end, the button 142 is provided with a hammer 150 which is engageable with an upper surface of the latch release spring 124.

The neon lamp N is illustrated as being suitably mounted on a support 152 fixed to the bobbin 104 or other structure within the handle portion 28. The reset button is fabricated from a translucent material and the neon lamp N is positioned beneath the reset button so as to create a glow in the surface of the reset button when the lamp is turned on.

As previously explained, after the iron 20 has remained motionless for the predetermined period of time, for example, 7 to 10 minutes, as previously described, a pulse of electrical energy is directed via the electronic circuit to the coil 106. The pulse is only momentary, no greater than one second in duration, and typically less than 50 milliseconds in duration. When the coil is thereby energized, the armature 108 is magnetically moved forward (to the left in Figure 8) toward the center of the coil 106 where the magnetic lines of force are concentrated and the strongest.

The non-magnetic molded extension 140 thereby engages the latch lever 130 pushing it forward against the bias of the latch spring 133 to unlatch the foot 132 from the front edge 134 of the printed circuit board 40. The force of the upward biased latch release spring 124 moves the latch lever 130 upwardly and with it the latch spring 133. Motion is also aided by the upward bias of the flexible blade 118 which moves upward upon release of the foot 132 and opens the switch contacts 114 and 120 to turn off power to the iron.

To restore power to the iron, the user pushes the reset button 142. With the downward motion of the reset button, the latch lever 130 is moved downwardly and with the rearward bias of the latch spring 133, the foot 132 engages the edge 134 of the printed circuit board 40. A cam surface 154 on the foot 132 slides along the edge 134 until a shoulder 156 is reached which allows the latch lever to pivot rearwardly (counterclockwise in Figure 11) such that the shoulder 156 firmly engages the undersurface of the printed circuit board. Thus, once again, the contacts 114 and 120 are closed to restore power to the iron. The contacts remain closed until the coil is again energized. The neon lamp N, being connected in parallel with the control and power circuits, is lighted when the contacts 114 and 120 are engaged. In an opposite fashion, when the contacts 114 and 120 are open, the neon lamp is turned off.

While a preferred embodiment of the invention has been disclosed in detail with specific values recited for certain of the electronic components for greater understanding, it should be understood by those skilled in the art that various modifications may be made to the illustrated embodiment without departing from the scope of the invention as described in the specification and defined in the appended claims.

Claims

1. Automatic switching apparatus for a hand held electrically operated appliance (20), characterized by:
switch means (46, 48) convertible between a power mode (Fig. 3) for electrically connecting the appliance to source of electrical power and a dormant mode (Fig. 4) for electrically disconnecting the appliance from the source of material power;
electromechanical means (74, 76, 78) operable when energized for converting said switch means (46, 48) to the dormant mode;
a motion sensor (MS) responsive to movement of the appliance (20) for generating a signal; and
timer means (42) for timing a preset period of time responsive to said motion sensor signal, and for energizing said electromechanical means (74, 76, 78) upon lapse of said preset period of time unless a subsequent motion sensor signal is generated.

2. The automatic switching apparatus of Claim 1, characterized in that said timer means (42) is responsive to the latest in a series of signals from said motion sensor (MS) for re-initiating a timing

sequence of said timer means (42) upon movement of the appliance (20) before completion of said preset period of time, said timer means (42) energizing said electromechanical means (74, 76, 78) upon uninterrupted completion of said preset period of time without movement of said appliance - (20).

3. The automatic switching apparatus of Claim 1 or 2, characterized by reset means (38, 54), manually operable, for converting said switch means (46, 48) to the power mode.

4. The automatic switching apparatus of Claim 3, characterized in that said reset means (38, 54) comprises latch means (54) for latching said switch means (46, 48) in the power mode.

5. The automatic switching apparatus of Claim 4, characterized in that:
said switch means (46, 48) comprises first (46) and second (48) mutually engageable contacts, and a resilient blade (52) biasing said second contact - (48) away from engagement with said first contact - (46);
said latch means (54) releasably engages with said blade (52) for holding said first and second contacts (46, 48) mutually engaged; and
said reset means, when actuated, effects engagement of said latch means with said blade.

6. The automatic switching apparatus of Claim 4 or 5, characterized in that said electromechanical means (74, 76, 78) comprises an electromagnetically driven armature (76) movable towards the away from said latch means (54), said armature when driven towards said latch means (54) releasing said latch means (54) to place said switch means (46, 48) in the dormant mode.

7. The automatic switching apparatus of Claim 6, characterized in that said armature (76) comprises a plunger (76) of a solenoid (36), said plunger moving a free floating rod (78) aligned therewith, said rod engaging said latch means (54) when said solenoid (36) is energized.

8. The automatic switching apparatus of any preceding claim, characterized by electronic circuitry means (40), which includes said timer means (42), for limiting said energizing of said electromechanical means (74, 76, 78) to a period of up to about one second in time upon energization of said electromechanical means (74, 76, 78) by said timer means (42).

9. An electric pressing iron, characterized in that it includes the automatic switching apparatus of any one of Claims 1 to 8.

10. The electric pressing iron of Claim 9, characterized by a sole plate (22) and a heating element (88) for heating said sole plate (22), said switch means (46, 48) connecting said heating element (88) to said source of electrical power in said power mode and disconnecting said heating element (88) from said source of electrical power in said dormant mode.

11. The electric pressing iron of Claim 10, characterized by a housing (24) above said sole plate (22) and containing said switch means (46, 48), said electromechanical means (74, 76, 78), said motion sensor (MS) and said timer means - (42); and by a manually depressible button (68; 142) resiliently urged outwardly with respect to said housing (24), actuation of said button (68; 142) resetting said switch means (46, 48) from said dormant mode to said power mode.

12. The electric pressing iron of Claim 11 when dependent directly or indirectly on Claim 5, characterized in that:
a latch member (54) extends downwardly from said button (68) and has a foot (60) at a lower end, in said power mode said foot (60) engaging under said blade (52) and being urged resiliently upwards to hold said second contact (48) in engagement with said first contact (46); and
said latch member (54) is moved by said electromechanical means (74, 76, 78), when energized, to disengage said foot (60) from said blade (52) and allow said blade (52) to bias said second contact - (48) away from said first contact (46) and effect said dormant mode.

13. The electric pressing iron of Claim 11 when dependent directly or indirectly on Claim 5, characterized in that:
a latch lever (130) extends downwardly from and is pivotally attached to an elongate latch release spring (124), said spring (124) extending under and being contactable by said button (142);
said latch lever (130) having a foot (132) engageable with a fixed member (40), and having a lobe - (138) engageable with said blade (118);
a latching spring (133) biasing said latch lever - (130) to pivot relative to said latch release spring - (124);
said button (142) upon actuation moving and stressing said latch release spring (124) to allow said latching spring (133) to effect engagement of said foot (132) under said fixed member (40) and to effect engagement of said lobe (138) with said blade (118) to move said second contact (120) into engagement with said first contact (114) and effect said power mode; and
said latch lever (130) being pivoted by said electromechanical means (74, 76, 78), when energized, to disengage said foot (132) from said fixed member - (40) and enable said latch release spring (124) to move said latch lever (130) upwardly and effect said dormant mode.

14. The electric pressing iron of Claim 10, 11, 12 or 13, characterized by said iron (20) having a handle portion (28) containing a printed circuit

board (40), said circuit board (40) having mounted thereon said switch means (46, 48), said electromechanical means (74, 76, 78), said motion sensor (MS) and said timer means (42).

15. The electric pressing iron of Claim 11, 12 or 13, characterized by a lamp (N) disposed under said button (68, 142) and electrically connected to said switch means (46, 48) for indicating when said electric iron (20) is in the power mode.

16. A method of operating a hand-held electrically operated appliance having an automatic switching apparatus as claimed in any one of Claims 1 to 8, characterized by the steps of:
connecting the appliance to a source of electrical power for operation of the appliance;
sensing the lack of motion of the appliance;
timing electronically the length of time that the appliance remains motionless; and
disconnecting the appliance from the source of electrical power when the length of time that the appliance remains motionless exceeds a preset value.

FIG. 1.

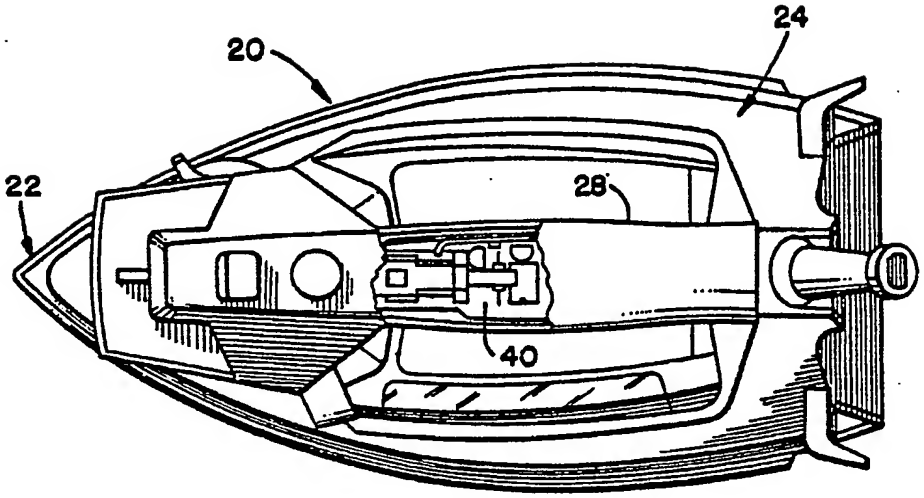

FIG. 2.

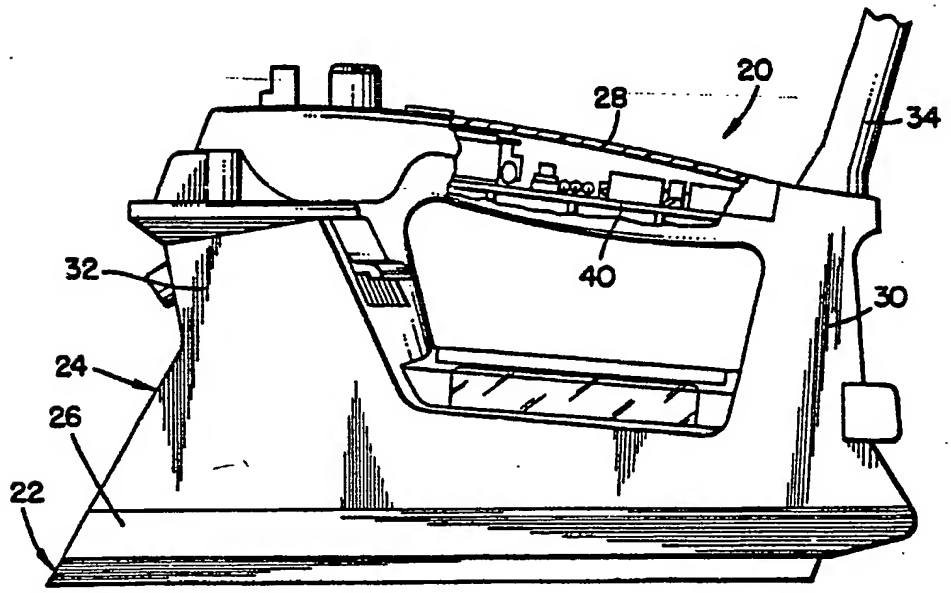

FIG. 3.

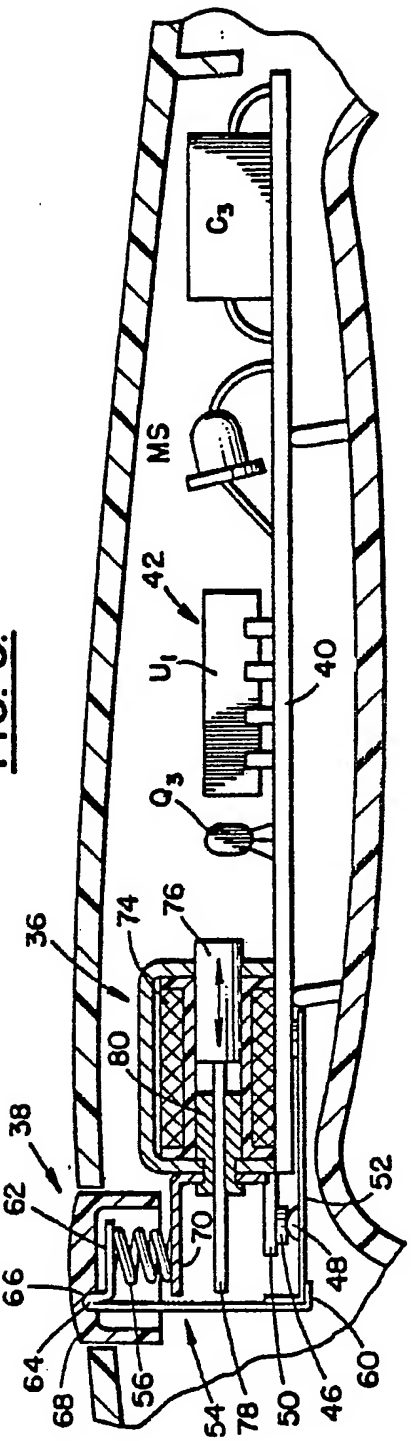

FIG. 5.

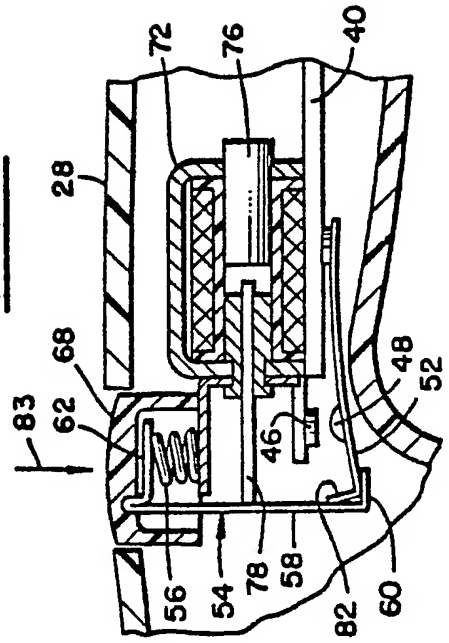

FIG. 4.

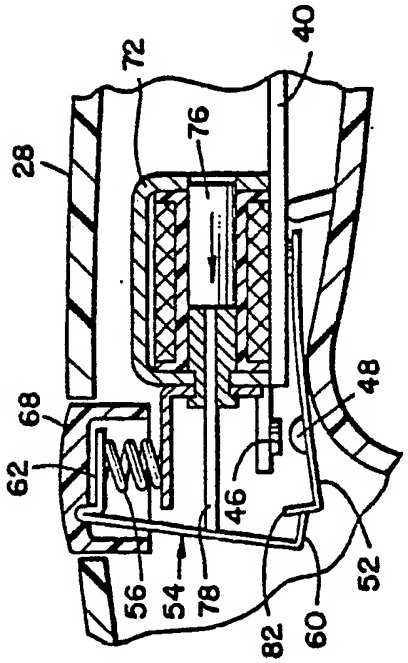

FIG. 6.

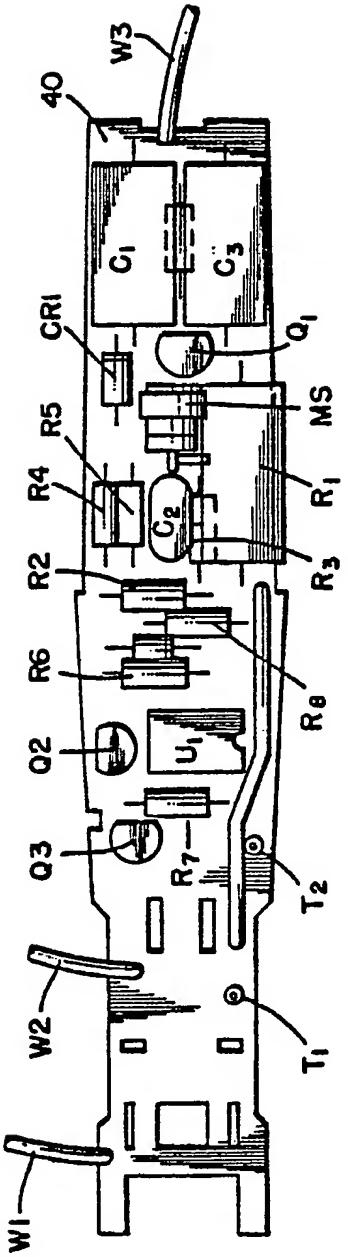
W3
40
C1
C3
CR1
Q1
MS
R5
R4
C2
R1
R3
R2
R6
R8
U1
Q2
Q3
R7
T2
W2
T1
W1

FIG. 8.

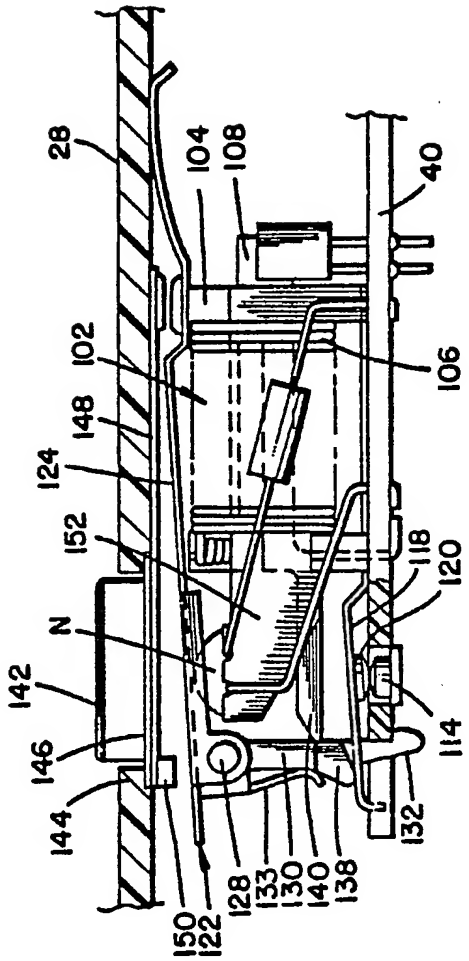
28
104
108
40
102
106
148
124
152
118
120
N
142
146
114
144
132
150
122
128
133
130
140
138

FIG. 7.

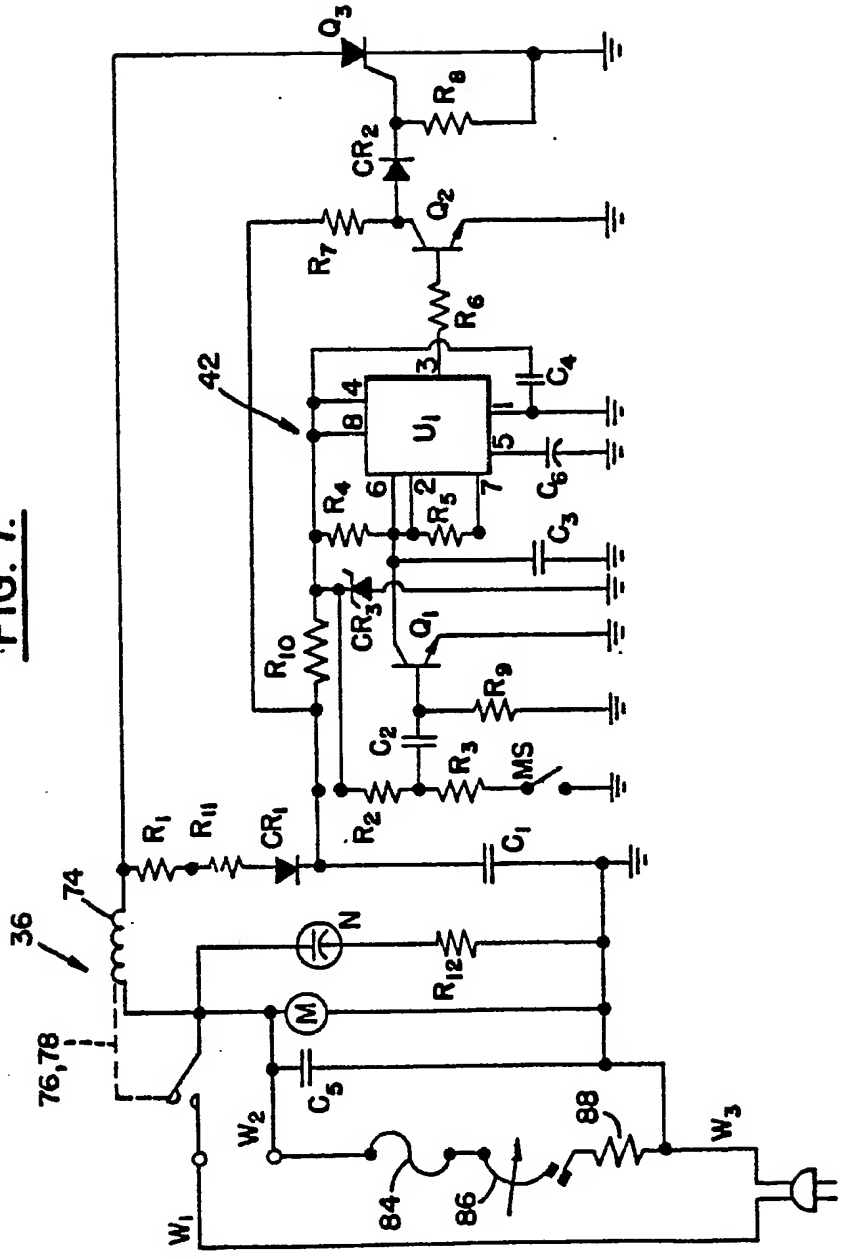
Q3
R8
CR2
Q2
R7
R6
42
U1
C4
C6
R4
R5
C3
CR3
Q1
R10
R9
C2
R3
MS
R2
C1
R1
R11
CR1
74
36
N
R12
M
76,78
C5
W2
88
W3
84
86
W1

FIG. 9.

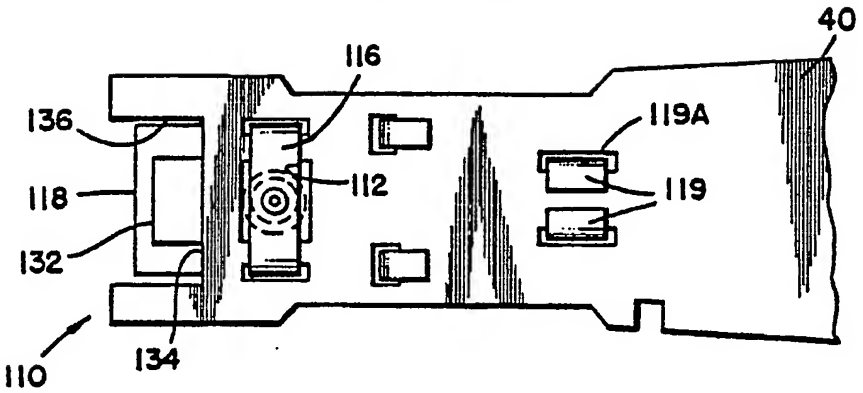

FIG. 10.

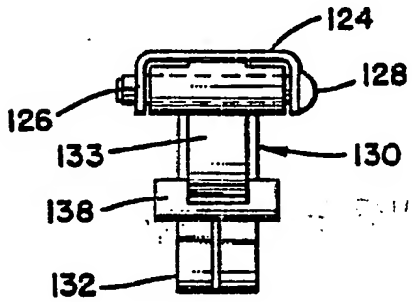

FIG. 11.